Göpel, Adolph | Encyclopedia.com

(*b*. Rostock, Germany, 29 September 1812; *d*. Berlin, Germany, 7 June 1847)

mathematics.

The son of a music teacher, Göpel was able, thanks to an uncle, the British consul in Corsica, to spend several years of his childhood in Italy, where in 1825–1826 he attended lectures on mathematics and physics in Pisa. His real studies did not begin until 1829, at the University of Berlin. After earning his doctorate there in 1835, he taught at the Werder Gymnasium and at the Royal Realschule before becoming an official at the royal library in Berlin. Since he had little contact with his mathematical colleagues, all we know about him is what C. G. J. Jacobi and A. L. Crelle wrote in the brief accounts they contributed to Crelle's *Journal für die reine und angewandte Mathematik* shortly after his death. Of the two, only Crelle knew him personally, and for but a short time.

In his doctoral dissertation Göpel sought to derive from the periodic continued fractions of the roots of whole numbers the representation of those numbers by certain quadratic forms. Following an eight-year pause after his dissertation, he wrote several works for Grunert's *Archiv der Mathematik und Physik*, for which he was then working. In them he showed thorough familiarity with Jacob Steiner's style of synthetic geometry.

Göpel owes his fame to "Theoriae transcendentium Abelianarum primi ordinis adumbratio levis," published after his death in *Journal für die reine und angewandte Mathematik*. The investigations contained in this paper can be viewed as a continuation of the ideas of C. G. J. Jacobi. The latter had taught that elliptic functions of one variable should be considered as inverse functions of elliptic integrals, but later he also explained them in his lectures as quotients of theta functions of one variable. Moreover, Jacobi had formulated the inverse problem, named for him, for Abelian integrals of arbitrary genus p. From this arose the next task: to solve the problem for $p = 2$. This was done by Göpel and Johann Rosenhain in works published almost simultaneously. In "Theoriae transcendentium…," Göpel started from sixteen theta functions in two variables (analogous to the four Jacobian theta functions in one variable) and showed that their quotients are quadruply periodic. Of the squares of these sixteen functions, four proved to be linearly independent. Göpel linked four more of these quadratics through a homogeneous fourth-degree relation, later named the "Göpel relation," which coincides with the equation of the Kummer surface. Göpel then presented differential equations satisfied by the sixteen theta functions and finally, after ingenious calculations, obtained the result that the quotients of two theta functions are solutions of the Jacobian inverse problem for $p = 2$.

BIBLIOGRAPHY

Göpel's major work is "Theorotie transcendentium Abelianarum primi ordinis adumbratio levis," in *Journal für die reine und angewandte Mathematik*, **35** (1847), 277–312, trans. into German as *Entwurf einer Theorie der Abelschen Transcendenten I. Ordnung*, Ostwalds Klassiker der Exacten Wissenschaften, no. 67 (Leipzig, 1895).

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